



Accelerated human activities affecting the spatial pattern of temperature in the Yangtze River Delta

Author(s): Xie ZQ, Du Y, Zeng Y, Yan ML, Zhu CY
Year: 2010
Journal: Quaternary International : The Journal of The International Union for Quaternary Research. 226 (2-Jan): 112-121

Abstract:

A zigzag city belt along the Yangtze River and Hangzhou rim has formed in the Yangtze River Delta in China due to the accelerated development of human activities and urbanization. Local climate change in the belt has affected the spatial patterns of surface air temperature (SAT). (1) There exist six major warmer centers with increasing rates of SAT from 0.28 to 0.54 degrees C per decade during 1961-2006 along the belt, namely Yangzhou, Nanjing, Jiangyin, Shanghai, Hangzhou and Ningbo. As the greatest areas of human activities and rapid urbanization in the Yangtze River Delta, Shanghai metropolitan areas have the maximum rates of increases in annual and seasonal mean SAT, which range from 0.23 to 0.50 degrees C per decade, and the strongest urban heat island effects, which are increasing at rates in the range of 0.11-0.15 degrees C per decade. (2) Local warming and urban heat island effects have created the largest and warmest SAT core in the Shanghai metropolitan areas, contributing to spatial pattern changes in SAT over the Yangtze River Delta. The spatial patterns of SAT for 2001-2006 and 1971-2000 significantly differ in the typical latitudinal pattern for 1971-2000 that has changed, mainly in Shanghai metropolitan areas. (3) The annual mean of the regional SAT will increase from 15.4 degrees C in 1961-1990 to 18.5 degrees C in 2071-2100 due to global warming and urban heat island effects according to the IPCC SRES A2 Scenario. This increase is notably higher than the increment of 2.5 degrees C from 15.4 degrees C to 17.9 degrees C due to global warming alone. The spatial distribution of the projected SAT with global warming and urban heat island effects is markedly different from that for global warming alone. In 2071-2100, the Shanghai metropolitan areas will have summer average temperatures of about 30.0-30.5 degrees C, which are higher than summer average temperatures of about 28.7 degrees C that would be expected from global warming alone. Higher average temperatures can have negative implications for energy and water consumption, human health and local ecosystems. The development and implementation of adaptation strategies are important and required by the policy makers from local government and city planning departments. (C) 2010 Elsevier Ltd and INQUA. All rights reserved.

Source: <http://dx.doi.org/10.1016/j.quaint.2010.04.027>

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

Temperature: Extreme Heat, Fluctuations

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content